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PATENTS



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

APPLICANTS: Choo et al. EXAMINER: Tentoni, Leo B.
SERIAL NO.: 10/667,515 GROUP ART UNIT: 1732
FILED: September 23, 2003 DOCKET: 6192.0261.D1 (8054L-206T)
FOR: **METHOD AND APPARATUS FOR CUTTING A NON-METALLIC
SUBSTRATE USING A LASER BEAM**

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
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REPLY BRIEF

In response to the Examiner's Answer dated July 19, 2006, please consider the following:

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Dated: September 19, 2006



Nathaniel T. Wallace

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1. Real Party in Interest

The real party in interest is Samsung Electronics Company, Limited, the assignee of the entire right, title, and interest in and to the subject application by virtue of an assignment of record.

2. Related Appeals and Interferences

None.

3. Status of Claims

Claims 8-13 are pending, stand rejected, and are under appeal.

Claims 1-7 have been cancelled.

A copy of the pending Claims is presented in the Appendix.

4. Status of Amendments

Claims 1-7 were cancelled and Claim 8 was amended by the Response to Notice of Non-Compliant Amendment filed October 5, 2005 and the corresponding Amended under 37 C.F.R. §1.111 filed September 7, 2005. This Amendment was entered.

5. Summary of Claimed Subject Matter

The present invention relates to an apparatus for cutting a non-metallic substrate.

Referring particularly to Claim 8 and Figure 2, an apparatus for cutting a non-metallic substrate (100) comprises a first laser beam generating means (110) that generates a first laser beam (120) for breaking molecular bonds of the non-metallic substrate material so as to heat a cutting path (150) formed on the non-metallic substrate and to form a scribe line (160) having a crack to a desired depth, and a second laser beam generating means (130) that generates a second laser beam (140) for propagating the crack along a scanning path of the first laser beam (120) in a depth direction of the substrate (see for example, page 11, lines 10-14), wherein the apparatus cuts the non-metallic substrate without a cooling device (see for example, page 20, lines 4-7).

6. Grounds of Rejection to be Reviewed on Appeal

A. Rejections Under 35 U.S.C. 102

i. Claim 8 stands rejected under 35 U.S.C. 102(b) as being anticipated by Chui (USPN 3,930,825).

B. Rejections Under 35 U.S.C. 103

i. Claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admissions.

7. Argument

A. The Claim Rejections Under 35 U.S.C. 102 Are Legally Deficient

Under 35 U.S.C. §102, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the claim. See MPEP §2131.

i. Claim 8 In View Of Chui

It is respectfully submitted that at the very least, Chui is legally deficient to establish a case of anticipation against independent Claim 8.

Claim 8 claims, “a first laser beam generating means that generates a first laser beam for breaking molecular bonds of the non-metallic substrate material so as to heat a cutting path formed on the non-metallic substrate and to form a scribe line having a crack to a desired depth; and a second laser beam generating means that generates a second laser beam for propagating the crack along a scanning path of the first laser beam in a depth direction of the substrate, wherein the apparatus cuts the non-metallic substrate without a cooling device.”

Chui teaches a method of producing an article of glass by cutting using a pair of focused laser beams which cut patterns in the glass having a common starting and ending point (see Abstract). Chui does not teach “a second laser beam generating means that generates a second laser beam for propagating the crack along a scanning path of the first laser beam in a depth direction of the substrate” as claimed in Claim 8. The pair of laser beams travel in separate paths to cut a pattern in the glass by cutting it out of a sheet of glass, for example, cutting two opposite 180 degree arcs to create a circle pattern (for example, see Figure 3 illustrating the two different

paths of a pair of lasers). Chui teaches that each laser of the pair of lasers takes a separate path. Further, it is clear that either of the pair of lasers of Chui is sufficient to cut through the glass substrate – as this is an object of the Chui invention – therefore, even where the first and second lasers have a common point along their separate paths (e.g., the starting point), the first laser cuts completely through the glass and does not form a “scribe line having a crack” as claimed in Claim 8. Therefore, Chui fails to teach “a second laser beam generating means that generates a second laser beam for propagating the crack along a scanning path of the first laser beam in a depth direction of the substrate” as claimed in Claim 8. Therefore, Chui fails to teach, either expressly or inherently, all the limitations of Claim 8.

1. Applicant’s Reply to Examiner’s Answer Regarding Chui

The Examiner suggests that Claim 8 may be read as “a first laser beam generating means, a second laser beam generating means and the absence of a cooling device.”

The Examiner cites *In re Schreiber* for the holding that claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber* is not believed to be applicable in the present case. Respectfully, Claim 8 includes further structural limitations than those suggested by the Examiner. For example, the claimed second laser beam generating means of Claim 8 propagates the crack along *a scanning path* of the first laser beam. Therefore, Claim 8 includes *structural* limitations to the laser beam generating means, for example, *the scanning path* is a structural limitation on the laser generating means. The claimed scanning path is determinative of the metes and bounds of the claim and thus is structural language. The Chui reference does not teach such a second laser beam propagating a crack along *a scanning path* of a first laser beam – for example, from Figure 3, it is clear that at most the lasers of Chui have a common start and end point, but that the paths are entirely

different (see Figure 3, glass article 72). Therefore, the apparatus of Chui fails to include all the *structural* limitations of Claim 8.

Accordingly, it is respectfully requested that the Board overrule the rejection.

B. The Claim Rejections Under 35 U.S.C. 103 Are Legally Deficient

In rejecting claims under 35 U.S.C. §103, the Examiner bears the initial burden of presenting a *prima facie* case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532 (Fed. Cir. 1993). The burden of presenting a *prima facie* case of obviousness is only satisfied by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 837 F.2d 1071, 1074 (Fed. Cir. 1988). A *prima facie* case of obviousness is established when the teachings of the prior art itself would appear to have suggested the claimed subject matter to one of ordinary skill in the art. In re Bell, 991 F.2d 781, 782 (Fed. Cir. 1993). If the Examiner fails to establish a *prima facie* case, the rejection is improper and must be overturned. In re Rijckaert, 9 F.3d at 1532 (citing In re Fine, 837 F.2d at 1074).

i. Claim 8 In View Of Applicant's Admissions

It is respectfully submitted that at the very least, the applicant's admissions are legally deficient to establish a *prima facie* case of obviousness against independent Claim 8.

Claim 8 claims "a first laser beam generating means that generates a first laser beam for breaking molecular bonds of the non-metallic substrate material so as to heat a cutting path formed on the non-metallic substrate and to form a scribe line having a crack to a desired depth."

Applicant's admissions teach "a cooling fluid beam 14 having a markedly lower

temperature than the heating temperature of the glass motherboard 10 is applied onto the rapidly heated cutting path 12. Accordingly, while the glass motherboard 10 is rapidly cooled, a crack is generated on a surface of the motherboard 10 to a desired depth to generate a scribe line 15” (see page 5, lines 1-18).

Applicant’s admissions do not teach or suggest “a first laser beam generating means that generates a first laser beam for breaking molecular bonds of the non-metallic substrate material so as to heat a cutting path formed on the non-metallic substrate and to form a scribe line having a crack to a desired depth” as claimed in Claim 8. Applicant’s admissions teach a cooling fluid generates a crack on a surface of the motherboard (see page 5, lines 7-8). Nowhere does applicant’s admissions teach or suggest a laser for generating a scribe line having a crack, essentially as claimed in Claim 8, much less cutting a non-metallic substrate without a cooling device. Therefore, applicant’s admissions fail to teach or suggest all the limitations of Claim 8.

1. Applicant’s Reply to Examiner’s Answer Regarding Applicant’s Admissions

The Examiner suggests that the Applicant’s admissions teach a scribing laser beam having the same function as recited in Claim 8. Respectfully, the scribing laser beam of the Applicant’s admissions functions to “rapidly heat the cutting path 12 of the motherboard 10” (see page 5, lines 1-4). Applicant’s admissions require a cooling fluid to generate the crack. Thus, the scribing laser beam of Applicant’s admissions does not meet the limitations of Claim 8, more particularly, “form a scribe line having a crack to a desired depth.”

More particularly, the Examiner states that the omission of an element (in this case, a cooling device) and its function (in this case, cooling of a substrate) would have been obvious to one of ordinary skill in the art at the time the invention was made if the function of the element is

not desired (see page 9, lines 7-11 of Examiner's Answer).

However, a cooling device in the Applicant's admissions is desirable and essential for generating a crack by cooling heated parts of a substrate (using thermal stress, see page 5, line 13 to page 6, line 4 of the application). In the present invention, a cooling device is not essential because an apparatus of the present invention only uses laser beams to cut a substrate (see page 8, lines 5-9 of the application). Therefore, it is believed that the omission of the cooling device is not obvious to one of ordinary skill in the art.

Indeed, the omission of an element and retention of its function is an indicia of unobviousness (see MPEP 2144.04, II B). Thus, it is Applicant's opinion that Claim 8 in the present invention is unobvious over the Applicant's admissions because an apparatus of the present invention can cut a substrate without a cooling device.

Accordingly, it is respectfully requested that the Board overrule the rejection.

D. CONCLUSION

The limitations of independent Claim 8 are not disclosed by Chui. The limitations of independent Claim 8 are not taught or suggested by Xuan or applicant's admissions. Claims 9-13 depend from Claim 8. The dependent claims are believed to be allowable for at least the reasons given for Claim 8. The terminal disclaimer is believed to overcome the non-statutory double patenting rejection.

Accordingly, it is respectfully requested that the Board overrule the rejections of Claims 8-13.

Date: September 19, 2006

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8. CLAIMS APPENDIX

What is claimed is:

8. An apparatus for cutting a non-metallic substrate, comprising:
 - a first laser beam generating means that generates a first laser beam for breaking molecular bonds of the non-metallic substrate material so as to heat a cutting path formed on the non-metallic substrate and to form a scribe line having a crack to a desired depth; and
 - a second laser beam generating means that generates a second laser beam for propagating the crack along a scanning path of the first laser beam in a depth direction of the substrate, wherein the apparatus cuts the non-metallic substrate without a cooling device.
9. The apparatus of claim 8, wherein the first laser beam has a wavelength having an absorptivity of 90% or more with respect to the non-metallic substrate.
10. The apparatus of claim 9, wherein the first laser beam is a 4.sup.th harmonics YAG laser beam having a wavelength of 266 nm.
11. The apparatus of claim 8, wherein the second laser beam is a CO₂ laser beam.
12. The apparatus of claim 8, wherein the first laser beam has a width less than that of the second laser beam.
13. The apparatus of claim 8, wherein the second laser beam is directly scanned onto the scribe line.